

Appln No. 10/665,304
Amdt date July 20, 2007
Reply to Office action of February 21, 2007

REMARKS/ARGUMENTS

The above amendments and these remarks are in response to the Office action mailed on February 21, 2007. Claims 1 and 25 have been amended. Claims 50-56 have been added and are directed to subject matter disclosed in the application as originally filed. No new matter has been added. Claims 1-3, 5-12, 25-39 and 50-56 are now pending in this application. Reconsideration on the basis of the above amendments and remarks below is kindly requested.

The undersigned wishes to thank the Examiner for the telephonic interview on May 4, 2007 where the prior art was briefly discussed.

The Examiner rejected claims 1, 7-12 and 34-36 under 35 U.S.C. §103(a) as being obvious over Komanduri, U.S. Patent No. 4,797,138. The Examiner rejected claims 1, 7 and 34-36 under 35 U.S.C. §103(a) as being obvious over Boyce, U.S. Patent No. 6,845,828. The Examiner also rejected claims 1-3, 6-12, 25-33 and 37-39 under 35 U.S.C. §103(a) as being obvious over Eyre et al., U.S. Patent No. 6,193,001. The Examiner further rejected claims 1-3, 6, 8-11, 25-31, 32, 33, 37 and 38 under 35 U.S.C. §103(a) as being obvious over JP 53-134804 ("JP '804"). Finally, the Examiner rejected claim 5 as being unpatentable over JP '804 as applied to claim 1 and further in view of Araki et al., U.S. Patent No. 4,437,800.

Claim 1 is directed to a method of manufacturing a cutting element comprising selecting an ultra hard material having a volume and selecting a substrate having a volume. The claim requires that at least a portion of the substrate has a density that is less than 100% of full density. The claim further requires that the density is selected in response to the volumes of the substrate and the ultra hard material for providing a desired level of constraint by the substrate to the ultra hard material shrinkage during sintering. Support for this requirement is found in the specification on page 6, line 21 to page 7, line 3 and on page 10 lines 15 to 21. According to the Examiner, since Komanduri discloses providing a substrate with up to 15% porosity, it discloses providing a

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density a substrate having a density which will obviously reduce shrinkage constraint of the ultra hard material during the sintering process, and thus provide the desired level of constraint. Applicants respectfully disagree. Komanduri does not appear to disclose, teach or suggest the concept of providing a desired level of constraint by the substrate to the ultra hard material shrinkage during sintering by selecting a substrate having at least a portion having an appropriate density that is less than 100%. Furthermore, Komanduri does not appear to disclose selecting a substrate having a portion having a density that is less than 100% wherein the density is selected in response to the volumes of the substrate and the ultra hard material. Thus, for either of the aforementioned reasons, Applicants submit that claim 1 is not rendered obvious by Komanduri.

Claims 7-12 and 34-36 are directly or indirectly dependent from claim 1. Claim 1 is now believed to be in condition for allowance over Komanduri. As such, Applicants submit that claims 7-12 and 34-36 are also not rendered obvious by Komanduri as being dependent from a claim not rendered obvious by Komanduri and for the additional limitations that these claims contain therein. For example, claim 34 further requires that the density is selected to minimize the constraint provided by the substrate to the ultra hard material shrinkage during sintering. Claim 35 is dependent from claim 1 and requires that the density is selected to minimize the shrinkage difference between the substrate and the ultra hard material during sintering. Neither of these features appear to be disclosed, taught or suggested by Komanduri. The only place where these features are disclosed, taught or suggested is in the above-referenced application.

Boyce also does not appear to disclose, teach or suggest selection of the density of at least part of the substrate for obtaining the desired level of constraint by the substrate to the ultra hard material shrinkage during sintering as required by claim 1, nor does it disclose, teach or suggest the selection of the density in response to the volumes of the substrate and the ultra hard material for providing the desired level of constraint by the substrate to the ultra hard material during sintering. Thus, for either of the aforementioned reasons, Boyce cannot render claim 1 obvious.

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Claims 7 and 34-36 are dependent from claim 1. As such, Applicants submit that claims 7 and 34-36 are also not rendered obvious by Boyce as being dependent from a claim not rendered obvious by Boyce and for the additional limitations that these claims contain therein. For example, Boyce also does not disclose, teach or suggest selecting a density to minimize a constraint provided by the substrate to the ultra hard material as required by claim 34, nor the selection of the density for minimizing the shrinkage difference between the substrate and the ultra hard material during sintering as required by claim 35.

Eyre et al. also does not appear to disclose, teach or suggest selection of the density of at least a portion of the substrate in response to the volumes of the substrate and the ultra hard material for providing a desired level of constraint by the substrate to the ultra hard material, as required by claim 1. Furthermore, Eyre et al. also does not appear to disclose, teach or suggest that the densities of the two portions are selected for providing a desired level of constraint by the substrate to the ultra hard material shrinkage during sintering. Thus, for either of the aforementioned reasons Eyre et al. also cannot render claim 1 obvious.

Claims 2, 3 and 6-12 are dependent from claim 1. As such, Applicants submit that claims 2, 3 and 6-12 are also not rendered obvious by Eyre et al. as being dependent from a claim not rendered obvious by Eyre et al. and for the additional limitations that these claims contain therein.

Claim 25 is directed to a method for manufacturing a cutting element comprising selecting a pre-sintered substrate having a first portion that has a first density less than 100% of full density and a second portion that has a second density that is different from the first density. The claim requires that the densities of the two portions are selected for providing a desired level of constraint by the substrate to the ultra hard material shrinkage during sintering. Again, as discussed, Eyre et al. does not disclose, teach or suggest the selection of the densities of the two portions for the purpose of providing a desired level of constraint by the substrate to the ultra

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hard material shrinkage during sintering. Furthermore, Eyre et al. does not appear to disclose the use of a pre-sintered substrate, but rather use of a substrate having a first portion and a second green state portion, not a pre-sintered portion. Thus, for either of the aforementioned reasons, Applicants submit that claim 25 is not rendered obvious by Eyre et al.

Claims 27-33 and 37-39 are directly or indirectly dependent from claim 25. As such, Applicants submit that claims 27-33 and 37-39 are also not rendered obvious by Eyre et al. as being dependent from a claim not rendered obvious by Eyre et al. and for the additional limitations that these claims contain therein. For example, Eyre et al. does not appear to disclose, teach or suggest selecting a density to minimize a constraint provided by the substrate to the ultra hard material as required by claim 37, nor the selection of the density for minimizing the shrinkage difference between the substrate and the ultra hard material during sintering as required by claim 38.

JP '804 discloses a high pressure type of boron nitride phase and a ceramic phase united with a parent body of ultra hard alloy. More specifically, JP '804 appears to disclose an ultra hard material, such as cubic boron nitride, united or bonded to the parent body. Thus, the parent body disclosed by JP '804 must be the substrate. JP '804 also appears to disclose that a powder of ultra-hard alloy, containing a higher amount of metallic components than the parent body (i.e., the substrate), is press molded, half sintered or sintered and is put on one side surface of the parent body and then sintered. Thus, the press molded, or half sintered, or sintered layer disclosed by JP '804 does not appear to be the substrate, but rather the ultra hard material layer. As such, JP '804 does not appear to disclose, teach or suggest the selection of a substrate having a portion having a density less than 100%, as required by claim 1. Nor does it appear to disclose, teach or suggest the selection of such density for providing a desired level of constraint by the substrate to the ultra hard material shrinkage during sintering. Nor does JP '804 appear to disclose, teach or suggest the selection of the density in response to the volumes of the substrate

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and the ultra hard material, as required by claim 1. As such, for either of the aforementioned reasons, JP '804 is not sufficient for rendering claim 1 obvious.

Furthermore, JP '804 does not appear to disclose the selection of a pre-sintered substrate as required by claim 25. Nor does JP '804 appear to disclose the selection of a substrate having a first portion that has a density less than 100% of full density and a second portion that has a density that is different from the first density. Nor does JP '804 appear to disclose, teach or suggest that the densities of the two portions are selected for providing a desired level of constraint by the substrate to the ultra hard material shrinkage during sintering. As such, for either of the aforementioned reasons, JP '804 does not render claim 25 obvious.

Claims 2, 3, 6 and 8-11 are directly or indirectly dependent from claim 1. Claims 26-33 and 37-38 are all directly or indirectly dependent from claim 25. As such, Applicants submit that these claims are also not rendered obvious by JP '804 as being dependent from a claim not rendered obvious by JP '804 and for the additional limitations that these claims contain therein.

Claim 5 is dependent from claim 1. Araki et al. does not make up for the deficiencies of JP '804 in rendering claim 1 obvious. As such, Applicants submit that claim 5 is also not rendered obvious by JP '804 in view of Araki et al.

Claim 50 has been added and is dependent from claim 1. Claim 51 has been added and is dependent from claim 25. Claims 1 and 25 are believed to be in condition for allowance. As such, Applicants submit that claims 50 and 51 are also in condition for allowance as being dependent from an allowable base claim and for the additional limitations they contain therein.

Claim 52 has been added and requires selecting a substrate having a volume and a first portion that has a first density less than 100% of full density and a second portion that has a density that is different from the first density. The claim further requires that the densities of the two

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portions are selected in response to the volume of the substrate and the volume of the ultra hard material for providing a desired level of constraint by the substrate to the ultra hard material shrinkage during sintering. As discussed, neither of the cited references appear to disclose the selection of the densities of the two portions in response to the volume of the substrate and the volume of the ultra hard material, nor the selection of the two densities for providing a desired level of constraint by the substrate to the ultra hard material shrinkage during sintering. As such, for either of the aforementioned reasons, Applicants submit that claim 52 is also allowable over the cited references.

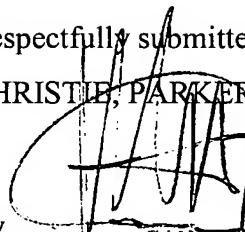
Claims 53 and 54 have been added and are directed to a method of manufacturing a cutting element comprising selecting an ultra hard material solid having a volume and selecting a substrate having a volume wherein at least a portion of the substrate has a density of less than 100% of full density. The claim further requires that the density of the substrate is selected in response to the volume of the substrate and the ultra hard material solid for providing a desired level of constraint by the substrate on the ultra hard material solid during sintering. Claim 54 is dependent from claim 53 and requires that the ultra hard material solid is porous. Support for claims 53 and 54 is found on the specification on pages 6, line 21 to page 7, line 3, on page 7, lines 17-20, and on page 10, lines 15-21. As discussed, neither of the cited references appear to disclose selecting a density in response to the volume of the substrate and the ultra hard material. Consequently, claims 53 and 54 should be allowable over the cited references.

Claim 55 has been added and is directed to a method of manufacturing a cutting element comprising selecting an ultra hard material solid and selecting a pre-sintered substrate wherein at least a portion of the substrate has a density that is less than 100% of full density of the at least a portion of the substrate. The claim requires that the density is selected for providing a desired level of constraint by the substrate onto the ultra hard material solid during sintering. Claim 56 is dependent from claim 55 and requires that the ultra hard material solid is porous. Again, support for claims 55 and 56 is found in the specification on page 6, line 21 to page 7, line 3, on

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page 7, lines 17-20, and on page 10, lines 15-21. As discussed previously, neither of the cited references appears to disclose use of a pre-sintered substrate wherein at least a portion of which has a density of less than 100% of full density and the selection of the density for providing a desired level of constraint by the substrate to the ultra hard material. As such, Applicants submit that claims 55 and 56 should also be allowable over the cited references.

The rejections to all claims pending in this application are believed to have been overcome and this application is now believed to be in condition for allowance. Should the Examiner have any remaining questions or concerns about the allowability of this application, the Examiner is kindly requested to call the undersigned attorney to discuss them.

Respectfully submitted,
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